

Expect the new normal for New Zealand's temperature to get warmer

January 25 2021, by James Renwick



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It might be summer in New Zealand but we're in for some [wild weather this week](#) with forecasts of heavy wind and rain, and a plunge in temperatures.

Long term, though, New Zealand is definitely warming up, along with the rest of the globe.

The National Institute of Water & Atmosphere Research (NIWA) says 2020 was our [7th warmest](#) in the 112-year [record](#) since 1909.

The national average [temperature](#) was 0.63°C above the 1981-2010 normal (more on that later). Six of the eight warmest years in the record have all occurred since 2013.

Up a degree

The overall linear trend in New Zealand's [Seven Station temperature record](#)—an average of readings taken at seven locations across the country—is a warming rate of about 1°C per century, close to the global rate over the same period.

That does not mean temperatures just become a little warmer each year, though. There are many ups and downs in a small country like New Zealand as we are exposed to influences from the tropics and the [Southern Ocean](#).

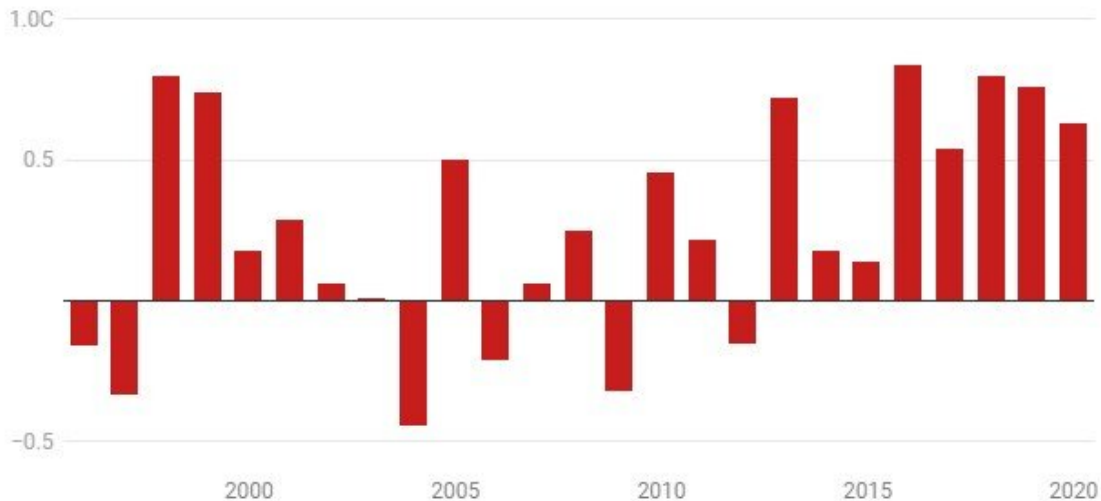
The year 2016 still stands as our [warmest on record](#) and as recently as 2012 we had a year that was a little [cooler than normal](#).

When we look at the chances of a warm or a cool year, that is where the warming trend is most obvious.

In the past 25 years of the record, six of the years were cooler than normal and 19 were warmer than normal. That's a ratio just over three to one in favor of warm years.

Warmer years 1996-2020

The variation each year between the seven-station average temperature and the measured normal temperature for 1981-2010.



In the first 25 years of the record, from 1909, 21 of the years were cooler than normal and four were warmer than normal, a ratio of about five to one in favor of cool years.

Prior to the 1970s, a year warmer than the 1981-2010 normal would have been exceptional. Now it's what we expect every year.

The rise of the 'new normal'

We all talk about a "new normal" but that is literally what will be happening this year.

The normals, the 30-year averages that countries use to define their

climates, will be recalculated this year.

The World Meteorological Organization [sets the rules](#) for [climate](#) normals that are used all over the world.

These normals are averages of temperature, rainfall and other quantities, calculated over the most recent three full decades.

From 2011 until last year, that was the 1981-2010 normal period. Now that 2020 is over, the meteorological services and climate centers of the world can calculate the new 1991-2020 normals that will be the standard until 2031.

Based on the [Seven Station](#) series numbers for New Zealand, the 1991-2020 temperature normal will be 0.14°C higher than the 1981-2010 normal.

That means the past eight years are at or above the new normal (see Warmer years 1996-2020 figure, above) with the most recent five years averaging about 0.6°C above the new normal.

Over the next few years, it is unlikely but still possible we will see a year cooler than the 1991-2020 normal, if we get a lot of southerly winds or if there was to be a large volcanic eruption in the tropics.

Cooler years 1909-1933

The variation each year between the seven-station average temperature and the measured normal temperature for 1981-2010.



Another degree warmer

If [greenhouse gas emissions](#) are not reduced rapidly and future normals were successively around 0.14°C warmer, New Zealand would be another degree warmer overall by the end of the century, beyond the degree of warming we have seen in the past 100 years.

Two degrees of warming would lock in [major changes in our climate](#) and at least a meter of sea level rise in the next century.

This year will feel the effects of the La Niña event in the tropical Pacific. La Niña events cool the globe a little on average, so 2021 is expected to come in around one tenth of a degree cooler globally than

2020, but still more than 1.1°C above pre-industrial temperatures.

On the other hand, because they bring more subtropical air our way and tend to go along with warmer than normal sea temperatures, La Niña events tend to warm New Zealand a little, even while they cool the globe.

Another important factor is how the Southern Annular Mode ([SAM](#)) behaves this year, a measure of climate variability that encircles the South Pole and extends up to New Zealand.

A positive SAM warms New Zealand and a negative brings cooler and stormier weather. It is very hard to predict in advance how the SAM will behave because there is a lot of randomness in the way it changes. But it was positive for much (61%) of [last year](#).

There are many other things that influence New Zealand's climate and average temperatures so it is hard to say exactly where the 2021 temperature will land. But it will almost certainly be warmer than normal—even warmer than the new normal.

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Provided by The Conversation

Citation: Expect the new normal for New Zealand's temperature to get warmer (2021, January 25) retrieved 25 June 2024 from <https://phys.org/news/2021-01-zealand-temperature-warmer.html>

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